

Habits of contact lenses use and the associated outcomes among medical students, King Faisal University, Alahsaa, Saudi Arabia

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ABSTRACT

Background: Contact lenses (CLs) are prosthetic devices used worldwide for many purposes. Inappropriate use of CLs increases the risk of complications, while adherence to CLs care and following the instructions are essential to prevent these complications. The aim of this study was to determine the pattern of CLs use, the adherence to hygiene practice, and the associated complications among medical students at King Faisal University in Alahsaa, Saudi Arabia. **Methods:** A cross-sectional study was done by an online self-administered questionnaire that was filled by medical students at King Faisal University in Alahsaa, Saudi Arabia. It included sociodemographic, history of CLs use, wear & replacement Habits, cleaning & disinfection procedures, care of accessories, complications associated with CLs use. **Results:** 110 subjects participated in the research. CLs were more commonly used by female for refractive correction. Only 30 (27%) participants were considered as real users. The average of both scores of WRH and CDP was above 3, with median of the two scores equals or above 3, indicating good compliance. However, COA score had an average of 2.48, which was below 3, with median score equal 2.5, demonstrating general poor compliance. Dry eye (88%) and acute red eye (51%) were reported as the most frequent complications of CLs use (88% and 51%, respectively). **Conclusion:** Improper use and non-compliance to hygiene practice of CLs pose a higher risk of complications. Education and encouraging CL users are necessary to improve the users' habits and outcomes.

Keywords: Medical students, Contact lenses, Dry eye, Alahsaa, Saudi Arabia.

1. INTRODUCTION

Contact lenses (CLs) are prosthetic devices that are used worldwide (AIsalameh et al., 2017). In 2019, the estimated number of CLs wearers in the world exceeded 150 million people (Moreddu et al., 2017). They are used for many purposes including cosmetic usage, refractive errors correction, a

therapeutic method for corneal pathologies, management of dry eye in some conditions like Stevens-Johnson syndrome and Sjogren syndrome, in addition to post-refractive surgery rehabilitation (Unnikrishnan & Hussain, 2009; Alipour et al., 2017; Şengör et al., 2018). They improve the wearers' quality of life as they provide a better appearance and less restriction during the activities; hence CLs are preferable by the younger age population (Şengör et al., 2018; Alzahrani et al., 2021).

Adherence to CLs care and following the instructions are the most important way to eliminate the complications of CLs (Alobaidan et al., 2018; Noushad et al., 2012; Albasheer et al., 2021).

Inappropriate use of CLs including improper cleaning and disinfection, reuse of disinfecting solutions, exposing lenses to water, sleeping without removing the lenses, inadequate or absent handwashing, not adhering to replacement schedules, and CLs over wear are considerable risk factors and causes of CLs related complications (Cope et al., 2017; Lievens et al., 2017). The most common complications are dry eye, giant papillary conjunctivitis, corneal abrasion, corneal edema, corneal ulcer, keratitis, and neovascularization (Unnikrishnan & Hussain, 2009). The most significant complication is loss of vision, which is resulted from microbial keratitis and endophthalmitis (Alzahrani et al., 2021). CLs are prescribed by qualified practitioners and are found as an over-counter product. The serious eye complications are often not revealed to CLs wearers when it is dispensed (Alzahrani et al., 2021; Alobaidan et al., 2018). In addition, adolescent and young adult CLs wearers are more likely to have eye infections (Alzahrani et al., 2021; Cope et al., 2017). It is crucial to increase awareness about CLs, hygiene practices, the pattern of use (Unnikrishnan & Hussain, 2009; Alobaidan et al., 2018) and health issues that could arise from CLs wear without proper supervision by an ophthalmologist (Şengör et al., 2018). In addition, encouraging CLs wearers who are noncompliant to the good practice will improve their eye problems after being fully adherent, especially when education is not the main issue (Lievens et al., 2017).

This paper aimed to detect the pattern of CLs use, the adherence to hygiene practice and the associated complications of CLs use among medical students, King Faisal University in Alahsaa, Saudi Arabia.

2. MATERIAL AND METHODOLOGY

A cross-sectional study was done via an online self-administered questionnaire that was filled by medical students at King Faisal University in Alahsaa, Saudi Arabia, with an estimated sample size of 110 participants in February and March 2021. The consent was obtained from the subject's prior filling the questionnaire and the ethical approval was taken from the ethical and research committee of King Faisal University. The questionnaire was adopted from a study conducted by Noushad et al., (2012). Additional modifications were applied to fit this study. It included sociodemographic data, history of CL use, wear & replacement habits, cleaning & disinfection procedures, care of accessories, complications associated CLs use.

Sociodemographic data included gender, studying year, marital status and income. History of CLs use contained the following items; types of CLs, cause of CLs usage (refractive correction, cosmetic, therapeutic), source of CLs (From physician, optometric store, or over the counter), wearing experience and duration. Participants who wear CLs for eight hours a day for six months or more are considered as real CL users. Subjects who used the CLs more than five days a week were termed regular users and who wear them less than five days a week were termed occasional users.

Compliance lever was evaluated by 21 items which were categorised into three aspects of CLs care practice. The first was concerning wear & replacement habits (WRH), category-I, the second aspect was concerning cleaning & disinfection procedures (CDP), category-II, while the third was about the care of accessories (COA), category-III. Each question can be answered by rating score from one to four; four for always (Total compliance), three for often, two for sometimes, one for never (Total non-compliance). There were four negative questions (Third and fourth question in category-I, second question in category-II, and fourth question in category-III) in which the response four for "never" (Fully compliant), three for "sometimes", two for "often" and one for "always" (Fully noncompliant).

The average score of the participants' responses was calculated and a score of more than three for each category of lens care was qualifying the participant to be compliant. After calculating the score for all categories, a participant who got a total score of three or more in all the categories separately was considered compliant. The last section was to report the complications associated with CLs wear among the participants.

Data analysis

Data was analyzed by Statistical Package for Social Science (SPSS) version 26. The mean and standard deviations were calculated for quantitative variables. Categorical data was reported as frequencies and percentages. The relation between the qualitative variables was identified by using Chi-square test. P-values less than or equal 0.05 is considered statistically significant.

3. RESULTS

150 participants filled the questionnaire, and by excluding daily CLs users, 110 of them were involved in the research. The Cronbach's Alpha was calculated for the compliance scale in the questionnaire and equal 0.808, indicating good reliability of the questionnaire.

Sample Characteristics and Demographics

93% of the participants were females. Most of them (64%) either studying in the 3rd-4th year or in the internship year, have single marital status (69%). 47.3% of them had extra adequate monthly income, while around the third (34.5%) had monthly incomes that were just adequate (Table 1).

Table 1 Sample Characteristics and Demographics

Variable	Category	Frequency	% (N= 110)
Gender	Male	8	7.3
	Female	102	92.7
Studying year	Prep year	16	14.5
	1 st	14	12.7
	2 nd	6	5.5
	3 rd	26	23.6
	4 th	4	3.6
	5 th	24	21.8
	Internship	20	18.2
Marital status	Single	76	69.1
	Married	32	29.1
	Divorced	2	1.8
Monthly income	Enough and save	52	47.3
	Enough	38	34.5
	Not enough	20	18.2

History of CLs Use

The largest proportion of participants (43%) used CLs for refractive correction while 20% used them as cosmetics, and 31% used them for both reasons. 61% got their CLs from optometric stores, 15% got them as prescription by a physician and around the quarter (24%) bought them as over-counter product. Most of the participants (78%) had 6 months or more experience in using CL. Most of the subjects (95%) either used monthly disposable soft lenses or conventional lenses (43%, 52%, respectively). In addition, most of the participants (78%) were occasional users. 65% used CLs for less than 8 hours a day, while most of the rest (35%) used them for up to sixteen hours maximum. Out of the sample (N = 110), 30 (27%) wear real users only and the analysis of the compliance was restricted only on those 30 real users.

Table 2 History of CLs Use

Variable	Categories	Percentage
Reason of Use	Refractive Correction	42.73%
	Cosmetic	30.91%
	Both Cosmetic and Refractive Correction	20.0%
	Therapeutic/Preventive	6.364%
Source	Prescribed by Physician	15.45%
	From Optometric Store	60.91%
	Over the Counter	23.64%
Time Experience with CL	Less than 6 Months	21.82%

Usage	6 Months and More	78.18%
CL Type	Weekly Disposable Soft Lens (Every 1-2 Weeks)	5.45%
	Monthly Disposable Soft Lens (Every 1-3 Months)	42.73%
	Conventional (Every 6-12 Months)	51.82%
Usage Rate / Week (Days / Week):	Less than 5 Days	78.18%
	More than 5 Days	21.82%
Usage Rate / Day (Hours / Day)	Less than 8 Hours	64.55%
	8-16 Hours	26.36%
	More than 16 Hours	1.82%
	All the Day	7.27%
CLs Real Users	CLs Real Users (30)	27.27%
	Non- CLs Users (80)	72.73%

Compliance

Category I- Wear & Replacement Habits (WRH) (Figure 1)

More than 80% on the participants were compliant regarding the following; avoidance of sleep with CL and avoidance of napping with CL. Most of the participants to a lesser extent (> 60%) were compliant regarding the following; wearing lenses as recommended duration daily and removing lens as soon as possible when eyes are red/irritated. 56% of them discarded used CLs and used a new pair as recommended. This means that 44% did not do this good habit, which was a considerable proportion. Most of the participants (67%) did not attend the visits that were suggested by the practitioner.

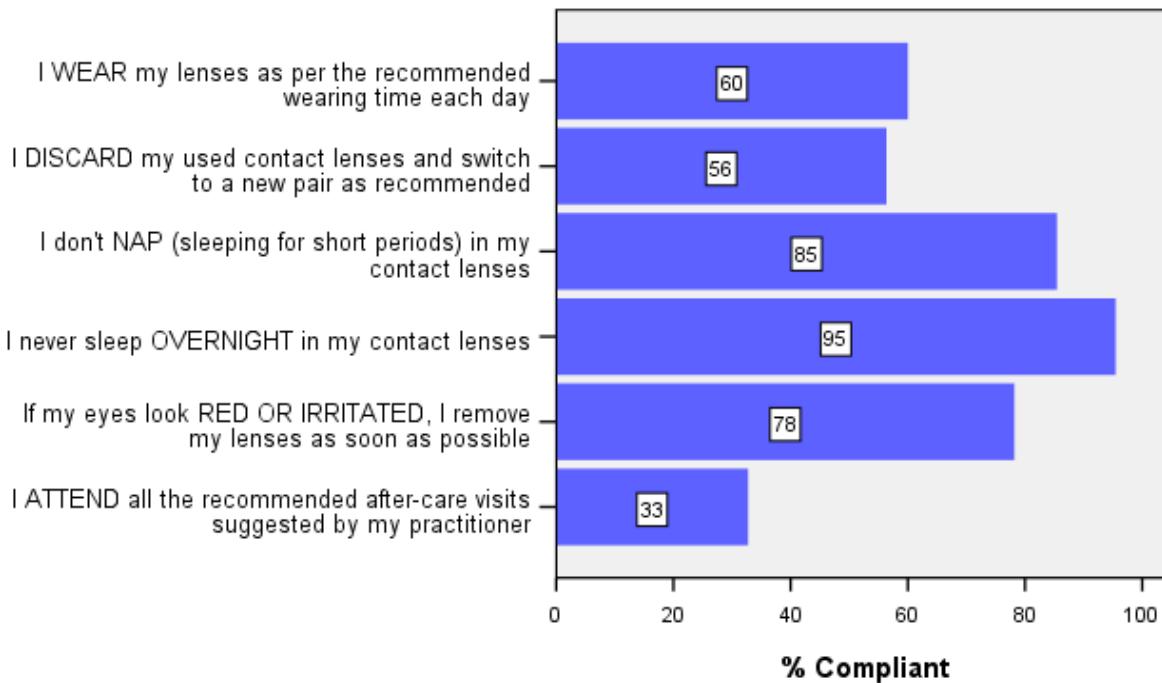


Figure 1 Wear & Replacement Habits (WRH)

Category 2- Cleaning & Disinfection Procedures (CDP) (Figure 2)

66% to 87% of the participants were compliant regarding all the listed habits, which showed a good level of CDP.

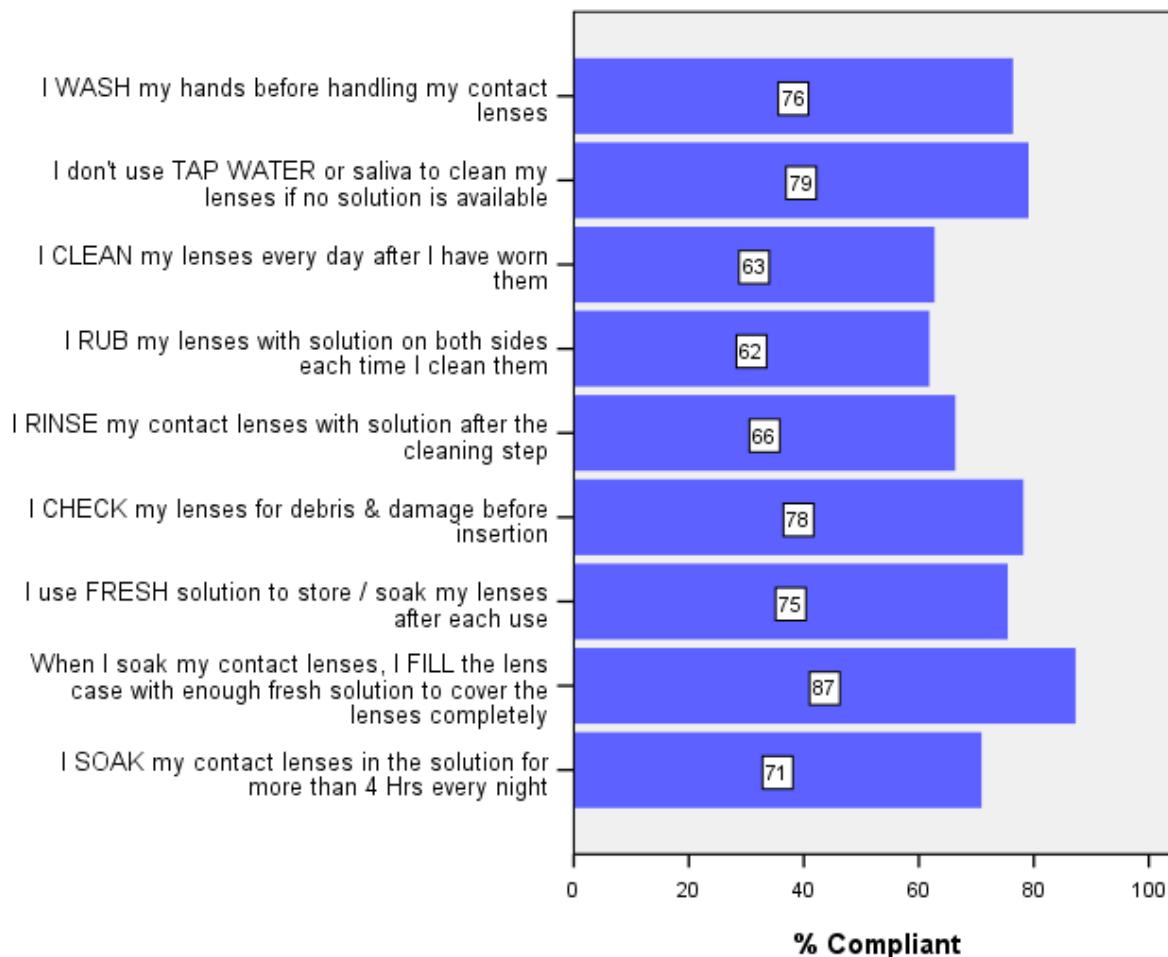


Figure 2 Cleaning & Disinfection Procedures (CDP)

Category 3- Care of Accessories (COA) (Figure 3)

Most of the listed habits (5 out of 6) were not done by at least around half of the subjects, which indicated low level of care of accessories. Specifically, most of the participants were not compliant regarding 3 good habits, namely, (1) cleaning CLs case with antiseptic solution/soap and air-dry it weekly, (2) allowing the lens case to air-dry after put in the lenses daily and (3) replacing the CLs case every three months. In addition, around half of them were not compliant regarding two good habits, namely, (1) recapping the bottle of antiseptic solution directly after use and (2) always checking the discard-after dates of CL solutions. The only good habit done by the majority (90%) was “not sharing CL case with friends.”

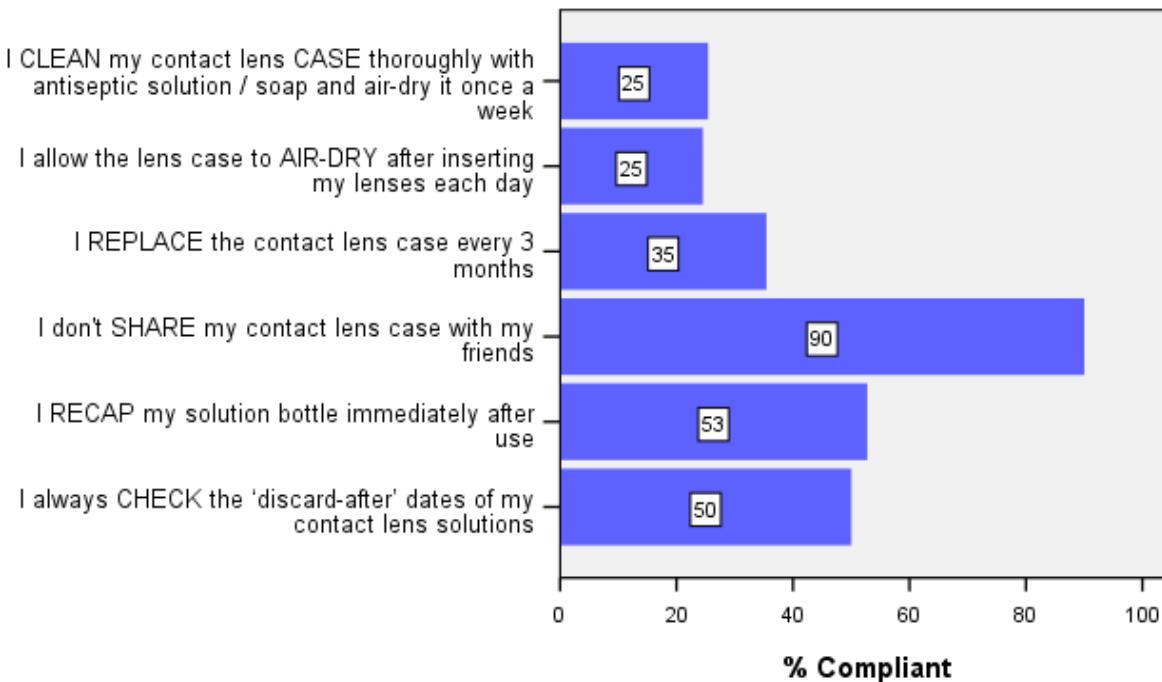
**Figure 3** Care of Accessories (COA)

Table 2 reveals that the average of both scores of WRH and CDP was above 3, with median of the two scores equals or above 3 “compliant subjects; 60% and 73% respectively”, which indicated good compliance. The average score of COA, however, equalled 2.48, with median score is 2.5 “compliant subjects; 25.5%”, thus indicated general low compliance of participants and that had affected both the general compliance percentage (which is 20%) and the average overall compliance score, which was 1.28.

Table 2 Overall Compliance

Compliance Score of:	Mean \pm SD	Median	% Compliant
WRH	3.04 \pm 0.51	3.00	60.00%
CDP	3.21 \pm 0.56	3.33	72.70%
COA	2.48 \pm 0.60	2.50	25.50%
Overall	1.28 \pm 0.20	1.29	20.00%

D- Difference in Compliance % across Different Groups (Table 3)

Compliance was found only significantly related to being a regular/occasional user, since the p-value was 0.016. However, no significant relation found between the percentage of compliant subjects and gender, source of CL and CL type (p-values > 0.05).

Table 3 Difference in Compliance % across Different Groups (Chi-square Test)

Variable	Categories	% Compliant	Chi-square's P-value
Gender	Male	0.0%	0.626
	Female	10.7%	
Experience	≥ 6 months	10.0%	N/A*
Source	Prescribed by physician	15.4%	0.677
	From Optometric store	6.3%	
	Over the counter	0.00%	
Regularity	Regular user	27.3%	0.016

CL type	Occasional user	0.00%	
	Disposable	5.3%	
	Conventional	18.2%	0.256

*Cannot be computed since there is only 1 group in comparison (invalid)

E- Complications of Usage (Figure 4)

The most frequent complications reported by participants were dry eye (88%) and acute red eye (51%). Other listed complications were mentioned by much less percentages of participants (varying between 1-10%).

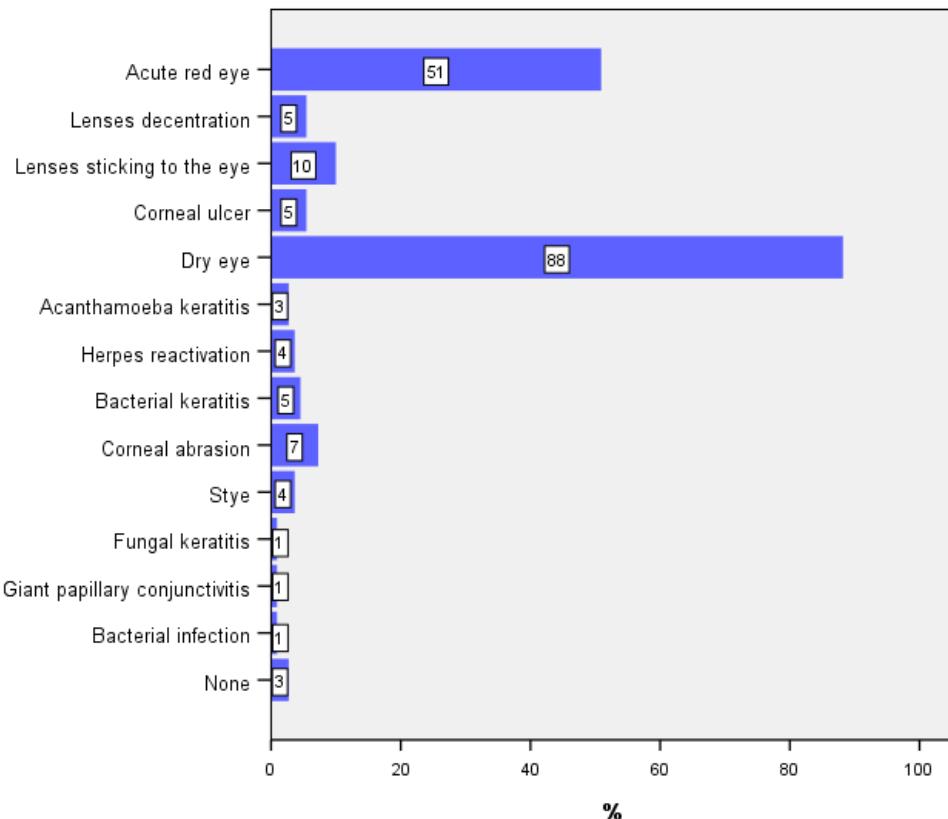


Figure 4 Complications of Usage

4. DISCUSSION

CLs are used worldwide for different purposes including refraction correction, cosmetic, therapeutic, and prophylactic use. This study was done to determine the compliance of medical students to hygiene practice and the associated outcomes of CLs use. In this paper, 92.7% of the subjects were females. Studies done by Tajunisah et al., (2008) and Mingo-Botín et al., (2020) showed that most CLs users were females (71.1% and 87.6%, respectively). 43% used CLs for refractive correction while 20% used them as cosmetics, and 31% used them for both reasons. However, in a study done among medical students at the University of Malaya; 53 (43.8%) were using CLs for cosmetic purposes (Tajunisah et al., 2008), and it was a similar finding to a study done by Ibrahim et al., (2018) and Kumar & Youssef, (2013).

Our results also showed that 61% of the subjects got their CLs from optometric stores while 15% were prescribed. Our results were resembled to the result found by Neyaz et al., (2017). As they found that most of the participants got their CLs from the optical shops, while the minority got them from hospitals. Regarding hygienic practices and habits, the majority of CLs users avoided sleeping and napping with CLs (More than 80%), did not share their CLs with friends (90%), and had good compliance to cleaning and disinfection procedures; including washing their hands before using CLs (76%), not using tap water or saliva in CLs cleaning (79%), and checking them for any debris or damage before insertion (78%).

Neyaz et al., (2017) reported that 96.3% of the respondents cleaned their CLs with lens solution while 3.7% used only tap water. In the study done by Alabaidan et al., (2017), good hand hygiene was reported among 75% of the respondents, but 20% of the users

were changing their CLs irregularly. Kumar & Youssef, (2013) found that 10% of their participants used their expired CLs, while 16% of them used their expired CLs sometimes, 66% of CLs users immersed their CLs in the cleaning solution completely, and only 38% visited the eye practitioner regularly. In our study, 56% of the respondents discarded their used CLs and used a new pair and the majority (87%) soaked the CLs with enough solution. In addition, a low number of CLs users (33%) attended the visits recommended by their practitioners.

We found that our participants were compliant to WRH and CDP (60.00% and 72.70%, respectively) as the average of their score was above 3, while the average of COA score is less than 3, showing a low compliance level (25.50%). Similar results were found in a study conducted by Noushad et al., (2012); the compliance score more than 3 was recorded in WRH and CDP. However, the level of compliance was the least in COA. We found that no significant relation between the compliance and gender, source of CLs and CLs type. Another study revealed that the excellent level of practice was not related to gender, type of CLs (Albaidan et al., 2018). Noushad et al., (2012), also found that the level of compliance was not significantly affected by gender and years of experience.

This paper also found that dry eye and acute red eye were the most frequent complications reported by participants (88% and 51%, respectively). Similarly, Alzahrani et al., (2021), reported that dryness and redness were the most known adverse effects (37% and 29%, respectively), while both conjunctivitis and acute red eye (19.8%) were reported to be highly prevalent (18.9% and 19.8, respectively) among medical students who wear CLs (Ibrahim et al., 2018).

5. CONCLUSION

CLs are more commonly used by female for refractive correction then for both refractive correction and cosmetic purposes. The CLs users were compliant to some aspects of proper CLs usage. However, they were generally considered noncompliant, although they were medical students. Improper use and non-compliance to hygiene practices of CLs will pose higher risk of complications. Education and encouraging the CLs users are crucial to enhance the users' habits and outcomes.

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Author contribution

All authors' who were participated in the study were listed. All authors of this study participated in the design of the study, data collection, analysis, writing and reviewing the manuscript and preparation of the final draft.

Noor Al Osaif: Writing the proposal, data collection, data entry and analysis, writing and review of the manuscript.

Walaa Aldairi: data collection, data entry and analysis, review of the manuscript.

Ethical approval

The study was approved by research and ethical committee of King Faisal University (ethical approval code: KFU-REC-2022-MAR-EA000468).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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